

# Encephalitis (Non-Arboviral)

This chapter focuses on non-arboviral encephalitis, which is NOT caused by infectious agents transmitted by insects or other arthropods. For information about arboviral encephalitis (transmitted by insects and other arthropods), refer to the chapters entitled *West Nile Virus (WNV)* and *Eastern Equine Encephalitis (EEE)*.



## Section 1:

## ABOUT THE DISEASE

### A. Etiologic Agent

Infectious agents that can cause encephalitis include bacteria, viruses, fungi, protozoans, and other parasites. Viral causes of encephalitis include herpes viruses, enteroviruses, mumps, measles, and varicella viruses; nonviral causes include bacteria such as *Listeria* and *Leptospira*, fungi such as *Histoplasma capsulatum* and *Cryptococcus neoformans*, protozoa such as *Toxoplasma gondii*, and metazoan parasites such as *Gnathostoma* sp. and *Taenia solium*. Encephalitis, which is not truly infectious, can follow certain infections (e.g., measles and mumps) and can occur as an immune-mediated disease. It rarely occurs as a result of vaccination.

### B. Clinical Description

Encephalitis is an inflammation of the brain. Symptoms vary depending on the etiologic agent and include alterations of consciousness, fever, headache, lethargy, confusion, and seizures. Since encephalitis can coexist with inflammation of the meninges, symptoms of meningitis (e.g., fever and stiff neck) may also be present.

### C. Vectors and Reservoirs

Humans are the reservoir for enteroviruses and for mumps, measles, herpes simplex, and varicella viruses. *H. capsulatum* and *C. neoformans* are organisms found in soil, especially soil contaminated with bird droppings. Cats (and members of the cat family) are the definitive host for *T. gondii*; they acquire the parasite from eating infected rodents or other infected meat. Monkeys are the reservoir for simian B virus (cercopithecine herpesvirus 1).

### D. Modes of Transmission

Enteroviruses are transmitted from person to person through ingestion of material contaminated by the feces of an infected person or through exposure to infectious respiratory droplets. They may also be transmitted indirectly via fomites. Some causes of encephalitis, such as *Listeria* sp. and *T. gondii*, may be acquired through consumption of contaminated food. Measles and varicella viruses are transmitted from person to person through the airborne route. Simian B disease is transmitted to humans through monkey bites or exposure of naked skin or mucous membranes to infectious monkey saliva or monkey tissue culture.

## E. Incubation Period

For most enteroviruses, the incubation period ranges from 3–6 days. For herpes simplex, it is 2–12 days; 3 days–3 weeks for simian B disease; and 2–17 days for histoplasmosis. Incubation periods for some of the other agents that can cause encephalitis (e.g., measles, mumps, or varicella) can be found in their respective disease-specific chapters in this manual.

## F. Period of Communicability or Infectious Period

The period of communicability varies by etiologic agent, and some of them are not transmitted from person to person (e.g., histoplasmosis and toxoplasmosis). Enteroviruses may be shed in feces for several days to many weeks after symptoms have resolved. Enteroviruses may also be shed in respiratory secretions, usually for no longer than one week following symptoms.

## G. Epidemiology

Most of the etiologic agents that cause encephalitis are found in most parts of the world. Cases occur sporadically throughout the year, and enteroviral infections peak in the late summer and early fall in temperate zones.

## H. Bioterrorist Potential

While most of these pathogens are not considered to be of risk for use in bioterrorism, the Centers for Disease Control and Prevention (CDC) lists agents that cause viral encephalitis as Category B bioterrorist agents.



## Section 2:

# REPORTING CRITERIA AND LABORATORY TESTING

## A. What to Report to the Massachusetts Department of Public Health (MDPH)

Report any case of encephalitis diagnosed by a health care provider—with or without laboratory results indicating the presence of a causative pathogen.

*Note: For encephalitis caused by an organism that is otherwise reportable (e.g., *Listeria* sp., *T. gondii*, measles virus, varicella virus) or for encephalitis caused by an arbovirus, please refer to Section 2A of the chapter specific to that organism or disease. Otherwise, use the criteria above. See Section 3C for information on how to report a case.*

## B. Laboratory Testing Services Available

The MDPH State Laboratory Institute (SLI), Virus Isolation Laboratory and Virus Serology Laboratory can provide testing for many of the agents that can cause encephalitis, both arboviral and non-arboviral.

**For viral agents, contact the SLI Virus Serology Laboratory at (617) 983-6396 or the SLI Virus Isolation Laboratory at (617) 983-6382 for more information on testing and specimen submission. For non-viral agents, contact the SLI Reference Laboratory at (617) 983-6607.**



## Section 3:

**REPORTING RESPONSIBILITIES AND CASE INVESTIGATION****A. Purpose of Surveillance and Reporting**

- ◆ To maintain a record of reported cases so that increases in number of cases can be identified, thus facilitating appropriate control and prevention initiatives.

**B. Laboratory and Health Care Provider Reporting Requirements**

Non-arboviral encephalitis is reportable to the local board of health (LBOH). The MDPH requests that health care providers immediately report to the LBOH in the community where the case is diagnosed, all confirmed or suspect cases of encephalitis, as defined by the reporting criteria in Section 2A. If this is not possible, call the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850.

Laboratories performing examinations on any specimens derived from Massachusetts residents that yield evidence of non-arboviral encephalitis shall report such evidence directly to the MDPH within 24 hours.

**C. Local Board of Health (LBOH) Reporting and Follow-Up Responsibilities***Reporting Requirements*

MDPH regulations (*105 CMR 300.000*) stipulate that non-arboviral encephalitis is reportable to the LBOH and that each LBOH must report any case of non-arboviral encephalitis or suspect case of non-arboviral encephalitis, as defined by the reporting criteria in Section 2A. Cases should be reported to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS) using an official MDPH *Generic Disease Case Report Form* (found at the end of this chapter). Please refer to the *Local Board of Health Timeline* at the end of this manual's *Introduction* section for information on prioritization and timeliness requirements of reporting and case investigation.

*Case Investigation*

1. The LBOH should call the MDPH promptly with initial information if it learns of a suspect or confirmed case of non-arboviral encephalitis. The phone numbers for the MDPH Division of Epidemiology and Immunization are (617) 983-6800 and (888) 658-2850.
2. Following prompt notification of the MDPH, it is the responsibility of the LBOH to complete a MDPH *Generic Disease Case Report Form* (found at the end of this chapter) by interviewing the case and others who may be able to provide pertinent information. Much of the information required on the form can be obtained from the health care provider or from the medical record.
3. For encephalitis caused by a specific organism (e.g., *Listeria* sp., *T. gondii*, measles virus, or varicella virus) or for arboviral encephalitis, please refer to the chapter specific to that organism or disease for reporting criteria.
4. Use the following guidelines to assist in completing the form:
  - a. Record encephalitis as the disease being reported.
  - b. Indicate the bacterial, viral, or other organism isolated/identified and type of specimen from which the pathogen was isolated/identified, if known.

- c. Accurately record the demographic information of the case(s).
  - d. Record the date of symptom onset, whether case was hospitalized and when, and other associated dates. Other medical information can be recorded in the “Comments” section at the bottom of the page.
  - e. Complete the “Import Status” section to indicate where the infection was acquired. If unsure, check “Unknown.”
  - f. Include any additional comments regarding the case.
  - g. If you have made several attempts to obtain case information but have been unsuccessful (e.g., the case or health care provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason(s) why it could not be filled out completely.
5. After completing the form, attach laboratory report(s) and fax or mail (in an envelope marked “Confidential”) to ISIS. The confidential fax number is (617) 983-6813. Call ISIS at (617) 983-6801 to confirm receipt of your fax. The mailing address is:

**MDPH, Office of Integrated Surveillance and Informatics Services (ISIS)**  
**305 South Street, 5<sup>th</sup> Floor**  
**Jamaica Plain, MA 02130**  
**Fax: (617) 983-6813**

6. Institution of disease control measures is an integral part of case investigation. It is the responsibility of the LBOH to understand, and if necessary, institute the control guidelines listed in Section 4.



## Section 4:

# CONTROLLING FURTHER SPREAD

### A. Isolation and Quarantine Requirements (*105 CMR 300.200*)

For most cases of encephalitis, there are no isolation and quarantine requirements. However, for encephalitis caused by an organism that is otherwise reportable or for encephalitis caused by an arbovirus, please refer to Section 4A of the chapter dealing with that specific organism or disease for the appropriate isolation and quarantine requirements.

### B. Protection of Contacts of a Case

In most cases of encephalitis, there are no recommendations for contacts. However, for encephalitis caused by an organism that is otherwise reportable or for encephalitis caused by an arbovirus, please refer to Section 4B of the chapter dealing with that specific organism or disease.

### C. Managing Special Situations

#### *Reported Incidence Is Higher Than Usual/Outbreak Suspected*

If the number of reported cases of non-arboviral encephalitis in your city/town is higher than usual or if you suspect an outbreak, investigate cases clustered in an area or institution to determine the source of infection and the mode of

transmission. A common vehicle and mode of transmission should be sought, and applicable preventive or control measures should be instituted. Additionally, identification of common risk factors (e.g., age, school, workplace, or activities) may lead to the institution of effective prevention and control measures. Consult with the epidemiologist on-call at the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850. The Division can help determine a course of action to prevent further cases and can perform surveillance for cases across town lines, which would otherwise be difficult to identify at the local level.

## **D. Preventive Measures**

Due to the wide variety of etiologic agents that can cause encephalitis and the differing modes of transmission, there is no single set of preventive measures to avoid infectious non-arboviral encephalitis. However, enteroviral and many other types of non-arboviral encephalitis may be prevented by enforcing measures that can prevent primary infection with the etiologic agent. Recommend that individuals:

- ◆ Always wash their hands thoroughly with soap and water before eating or preparing food, after using the toilet, after changing diapers, after wiping or blowing noses, and after contact with any nose, throat, or eye secretions.
- ◆ Wash own hands as well as the child's hands after changing diapers, and dispose of the diapers in a sanitary manner.
- ◆ Dispose of towels or tissues contaminated with nose, throat, or eye fluids in a sanitary manner.
- ◆ If caring for someone with diarrhea, scrub hands with plenty of soap and water after cleaning the bathroom, after helping the person use the toilet, or after changing diapers, soiled clothes, or soiled sheets.
- ◆ Keep current on all recommended immunizations.



## ADDITIONAL INFORMATION

There is no formal CDC surveillance case definition for infectious non-arboviral encephalitis. There are formal case definitions for many of the primary infections that can go on to include encephalitis in their clinical presentation (i.e., measles, mumps, or varicella). For reporting to the MDPH, always use the criteria outlined in Section 2A.



## REFERENCES

- American Academy of Pediatrics. Pickering L.K., ed. *Red Book: 2003 Report of the Committee on Infectious Diseases, 26<sup>th</sup> Edition*. Elk Grove Village, IL, American Academy of Pediatrics, 2003.
- CDC. Case Definitions for Infectious Conditions Under Public Health Surveillance. *MMWR*. 1997; 46(RR-10).
- Heymann, D., ed. *Control of Communicable Diseases Manual, 18<sup>th</sup> Edition*. Washington DC, American Public Health Association, 2004.
- Mandell, G., Bennett, J., Dolin, R., eds. *Principles and Practice of Infectious Diseases, 5<sup>th</sup> Edition*. New York, John Wiley and Sons, 2000.
- MDPH. *Regulation 105 CMR 300.000: Reportable Diseases, Surveillance, and Isolation and Quarantine Requirements*. MDPH, Promulgated November 4, 2005.



**FORMS & WORKSHEETS**  
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## LBOH Action Steps

*This form does not need to be submitted to the MDPH with the case report form. It is for LBOH use and is meant as a quick-reference guide to encephalitis case investigation activities.*

LBOH staff should follow these steps when encephalitis is suspected or confirmed in the community. For more detailed information, including disease epidemiology, reporting, case investigation, and follow-up, refer to the preceding chapter.

- ☐ Notify the MDPH Division of Epidemiology and Immunization, at (617) 983-6800 or (888) 658-2850, to report any suspect case(s) of encephalitis.
- ☐ Fill out the case report form (attach laboratory results, if available).
- ☐ Send the completed case report form (with laboratory results) to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS).